CLAIMS

What is claimed is:

1. A method of forming a package, comprising:

placing a film against a flip-chip assembly, wherein the flip-chip assembly includes a die, an electrical connection, and a mounting substrate;

underfilling the die with underfill material;

curing the underfill material; and

after beginning curing the underfill material, removing the film.

2. The method according to claim 1, wherein the film includes a tacky film.

3. The method according to claim 1, wherein the film includes a tacky film, and wherein curing the underfill material is carried out under heat that causes the tacky film to release from the flip-chip assembly.

4. The method according to claim 1, wherein after beginning curing the underfill material and removing the film, curing includes:

curing the underfill material that is in contact with the film;

removing the film; and thereafter

curing the underfill material that is between the die and the mounting substrate.

5. The method according to claim 1, wherein after beginning curing the underfill material and removing the film, curing includes:

curing the underfill material that is in contact with the film by conductive heat transfer from a mold press;

removing the film; and thereafter

curing the underfill material that is between the die and the mounting substrate by placing the package into a curing oven.

6. The method according to claim 1, wherein after beginning curing the underfill material and removing the film, curing includes:

heating the package in a curing oven under conditions to cause the tacky film to release from the flip-chip assembly.

7. The method according to claim 1, wherein after beginning curing the underfill material and removing the film, curing includes:

heating the package in a curing oven under conditions to cause the tacky film to release from the flip-chip assembly, wherein heating includes a first temperature ramp to a temperature range from about 100° C to about 180° C, a temperature hold at a temperature in this range, a second temperature ramp to a temperature range from about 140° C to about 260° C, and cooling.

8. The method according to claim 1, wherein after beginning curing the underfill material and removing the film, curing includes:

heating the package in a curing oven under conditions to cause the tacky film to release from the flip-chip assembly, wherein heating includes a single step temperature ramp to a temperature in a range from about 140° C to about 240° C; and

cooling.

9. The method according to claim 1, wherein the underfill material has a viscosity that causes it to draw between the die and the mounting substrate without the assistance of a pressure differential.

10. The method according to claim 1, wherein the underfill material has a viscosity that causes it to draw between the die and the mounting substrate, further including:

flowing the underfill material from a first edge of the die to an opposite, second edge of the die by a pressure differential.

11. A method of forming a package, comprising:

stretching a flexible film over die that is mounted on a mounting substrate to seal the flexible film thereupon;

flowing underfill material between the die and the mounting substrate with a source and a vent;

heating the underfill material to a first curing temperature; and

after reaching the first curing temperature, removing the flexible film.

12. The method according to claim 11, wherein the film is selected from a non-tacky film and a tacky film.

13. The method according to claim 11, wherein the film includes a tacky film, and wherein heating the underfill material to a first curing temperature is carried out to cause the underfill material to cure, and wherein the first curing temperature is reached to a temperature range from about 100° C to about 180° C; and

wherein the second curing temperature causes the tacky film to release from the die and mounting substrate, and wherein the second curing temperature is reached to a temperature range from 140° C to about 260° C.

14. The method according to claim 11, wherein the film is a non-tacky film and wherein after heating the underfill material to a first curing temperature and removing the film, curing includes:

gelling the underfill material that is in contact with the film;

removing the film; and the process further including:

curing the underfill material that is between the die and the mounting substrate.

15. The method according to claim 11, wherein heating the underfill material to a first curing temperature includes:

heating along a first temperature ramp to a first temperature range from about 100° C to about 180° C; and further including:

holding the first temperature;

heating along a second ramp to a temperature range from about 140° C to about 260° C; and

cooling.

16. The method according to claim 11, wherein the underfill material has a viscosity that causes it to draw between the die and the mounting substrate, further including:

flowing the underfill material from a first edge of the die to an opposite, second edge of the die by a pressure differential.

17. A chip package comprising:

a die;

a mounting substrate;

an electrical connection disposed between the mounting substrate and the die;

a cured underfill material including a fillet portion, and an interstitial portion disposed between the die and the mounting substrate, wherein the fillet portion includes a surface roughness and pattern that is characteristic of an interstitial film surface roughness and pattern.

18. The chip package according to claim 17, wherein the interstitial film surface roughness and pattern is derived from a film selected from a tacky film and a non-tacky film.

19. The chip package according to claim 17, wherein the fillet portion exhibits a single-stage solidification profile in cross section.

20. The chip package according to claim 17, wherein the fillet portion exhibits a symmetrical rectilinear or other controllable footprint on the mounting substrate.

21. The chip package according to claim 17, wherein the fillet portion exhibits a concave curvilinear cross-sectional profile.

22. The chip package according to claim 17, wherein the electrical connection disposed between the mounting substrate and the die is selected from a ball grid array, a collapsed ball grid array, and a pin grid array.

23. A chip-packaging process system comprising:

a die;

a mounting substrate;

an electrical connection disposed between the mounting substrate and the die;

a tacky film that is disposed over the die and stretched onto the mounting substrate;

a mold press that gives a shape to the film;

an underfill material disposed between the die and the mounting substrate; and

an underfill inlet and outlet system that communicates through the film.

24. The chip-packaging process system according to claim 23, wherein the underfill inlet and outlet system includes an underfill conduit and a vent.

25. The chip-packaging process system according to claim 23, wherein the underfill material includes a fillet shape disposed between the die and the mounting substrate, and wherein the a mold press that gives shape to the film includes a heater element disposed at the fillet.

26. The chip-packaging process system according to claim 23, further including:

a first heating source for ramping the temperature of the underfill material to a first cure state; and

a second heating source for causing the tacky film to release from the die, the fillet, and the mounting substrate.